

What is claimed is:

1. A device for applying a force to a spinal column segment, comprising:
a pair of opposite engagement ends each configured for engagement with a portion of the spinal column segment;
a mechanism disposed between said pair of opposite engagement ends moveable to vary the distance between said engagement ends;
means for moving said mechanism in an extend direction to apply a distraction force and in a retract direction to apply a compression force; and
means for locking said mechanism having a first position in engagement with said mechanism such that said mechanism is not movable in one of said extend direction and said retract direction and is movable in the other one of said extend direction and said retract direction, said means for locking having a second position allowing said mechanism to be moved in both said extend direction and said retract direction.
2. The device of claim 1, wherein each of said pair of opposite engagement ends is coupled to an anchor engaged to a vertebra.
3. The device of claim 1, wherein said mechanism includes:
a body integral with one of said pair of opposite engagement ends, said body defining a passage therethrough and a bore intersecting said passage; and
a rack movably received in said passage, said rack integral with the other of said pair of opposite engagement ends and having a plurality of teeth formed therealong.

4. The device of claim 3, wherein said means for moving said mechanism includes a pinion rotatably received in said bore in engagement with said rack.

5. The device of claim 4, wherein said pinion includes a number of teeth therearound that interdigitate with selective ones of said plurality of teeth of said rack.

6. The device of claim 3, wherein said means for locking is spring biased to said first position.

7. The device of claim 3, wherein said means for locking includes:
a lock member movably mounted in a chamber of said body and engageable with said rack; and
a lock pin engaged to said lock member and extending therefrom through said body, said lock pin engageable to move said lock member from said first position to said second position.

8. The device of claim 7, wherein said lock member is movable along at least one camming surface in said chamber between said first position and said second position.

9. The device of claim 7, wherein said lock pin has a cam member extending from a distal end thereof and said lock member defines a receptacle sized to receive said cam member.

10. The device of claim 9, wherein said cam member moves in said receptacle as said lock member is moved between said first position and said second position.

11. The device of claim 7, wherein said lock member includes a number of teeth engageable with said plurality of teeth of said rack, at least one of said number of teeth having an engaging wall and an advancing wall, said engaging wall of said at least one of said number of teeth of said lock member engaging at least one of said plurality of teeth of said rack such that said mechanism is not moveable in one of said extend direction and said retract direction, said advancing wall engaging said at least one of said plurality of teeth of said rack such that said mechanism is moveable in the other one of said extend direction and said retract direction.

12. The device of claim 11, wherein said mechanism has a central axis extending in the extend and retract directions, said engaging wall has a slope relative to said central axis that is greater than a slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

13. The device of claim 12, wherein said advancing wall has a slope relative to said central axis that is less than the slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

14. The device of claim 1, wherein each of said pair of engagement ends includes a shaft extending generally in the extend and retract directions and an enlarged end extending from said shaft.

15. A device for applying a force to a spinal column segment, comprising:
a body having a first engagement end, said body defining a passage therethrough and a bore intersecting said passage; and

a rack movably received in said passage, said rack having a second engagement end opposite said first engagement end;

a pinion rotatably received in said bore and in operative engagement with said rack to move said first and second engagement ends in an extend direction and a retract direction; and

a locking mechanism mounted to said body, said locking mechanism having a first position in engagement with said rack locking said first and second engagement end from movement in one of said extend direction and said retract direction while allowing said first and second engagement ends to be moved in the other one of said extend direction and said retract direction, said locking mechanism having a second position allowing said first and second engagement ends to be moved in both said extend direction and said retract direction.

16. The device of claim 15, wherein each of said first and second engagement ends is coupled to an anchor engaged to a vertebra.

17. The device of claim 16, wherein each of said pair of engagement ends includes a shaft extending generally in the extend and retract directions and an enlarged end extending from said shaft.

18. The device of claim 15, wherein said pinion includes a number of teeth that interdigitate with selective ones of a plurality of teeth formed along said rack.

19. The device of claim 15, wherein said locking mechanism includes a lock member spring biased to said first position.

20. The device of claim 19, wherein said lock member is movably mounted in a chamber of said body in engagement with said rack, said locking mechanism including:
a lock pin engaged to said lock member and extending therefrom through said body, said lock pin engageable to move said lock member from said first position to said second position.

21. The device of claim 20, wherein said lock member is movable along at least one camming surface in said chamber between said first position and said second position.

22. The device of claim 20, wherein said lock pin has a cam member extending from a distal end thereof, said lock member defining a receptacle sized to receive said cam member.

23. The device of claim 22, wherein said cam member moves in said receptacle as said lock member is moved between said first position and said second position.

24. The device of claim 20, wherein said lock member includes a number of teeth engageable with said plurality of teeth of said rack, at least one of said number of teeth having an engaging wall and an advancing wall, said engaging wall of said at least one of said number of teeth of said lock member engaging at least one of said plurality of teeth of said rack such that said mechanism is not moveable in one of said extend direction and said retract direction, said advancing wall engaging said at least one of said plurality of teeth of said rack such that said mechanism is moveable in the other one of said extend direction and said retract direction.

25. The device of claim 24, wherein said mechanism has a central axis extending in the extend and retract directions, said engaging wall has a slope relative to said central axis that is greater than a slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

26. The device of claim 25, wherein said advancing wall has a slope relative to said central axis that is less than the slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

27. A device for applying a force to a spinal column segment, comprising:

a body having a first end member, said body defining a passage therethrough and a chamber in communication with said passage;

a rack moveably received in said passage, said rack having a second end member opposite said first end member;

a driving mechanism in operative engagement with said rack to move said first and second end members in an extend direction for application of a distraction force and in a retract direction for application of a compression force; and

a lock member positioned in said chamber of said body, said lock member having a lock pin engaged thereto engageable to move said lock member between a first position wherein said lock member engages said rack and a second position wherein said lock member is not engaged with said rack.

28. The device of claim 27, wherein:

in said first position said lock member prevents said first and second end members from being moved in one of said extend direction and said retract direction and allows said first and second end members to be moved in the other of said extend direction and said retract direction; and

in said second position said first and second end members are moveable in both said extend direction and said retract direction.

29. The device of claim 27, wherein said lock member is spring biased to said first position.

30. The device of claim 29, further comprising a spring between said body and said lock pin to spring bias said lock member to said first position.

31. The device of claim 27, wherein said body includes a bore in communication with said passage and said drive mechanism includes a pinion in said bore having a number of teeth that interdigitate with teeth formed along said rack.

32. The device of claim 27, wherein said lock member includes at least one tooth engageable with said rack to prevent said rack from being moved in one of the extend direction and the retract direction.

33. The device of claim 27, wherein said lock member includes an engagement surface and said lock pin includes a cam member engageable with said engagement surface to move said lock member between said first position and said second position.

34. The device of claim 33, wherein said cam member is slidable along said engagement surface.

35. The device of claim 27, wherein said lock member includes a number of teeth engageable with at least one of a plurality of teeth along said rack, at least one of said number of teeth having an engaging wall and an advancing wall, said engaging wall of said at least one of said number of teeth of said lock member engaging at least one of said plurality of teeth of said rack so that said mechanism is not moveable in one of said extend direction and said retract direction, said advancing wall engaging said at least one of said plurality of teeth of said rack so that said mechanism is moveable in the other one of said extend direction and said retract direction.

36. The device of claim 35, wherein said rack has a central axis extending in the extend and retract directions, said engaging wall has a slope relative to said central axis that is greater than a slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

37. The device of claim 36, wherein said advancing wall has a slope relative to said central axis that is less than the slope relative to said central axis defined by walls of said at least one of said plurality of teeth of said rack.

38. The device of claim 27, wherein:
in said first position said lock member prevents said first and second end members from being moved in either of said extend direction and said retract direction;
and

in said second position said first and second end members are moveable in both said extend direction and said retract direction.

39. A device for applying a force to a spinal column segment, comprising:

- a pair of opposite engagement ends each configured for engagement with a portion of the spinal column segment;
- a mechanism disposed between said pair of opposite engagement ends moveable to vary the distance between said engagement ends;
- a driving mechanism operable to move said opposite ends in an extend direction to apply a distraction force and in a retract direction to apply a compression force; and
- a locking mechanism having a first position in engagement with said mechanism such that said opposite ends are not movable in one of said extend direction and said retract direction and is movable in the other one of said extend direction and said retract direction, said locking mechanism having a second position allowing said mechanism to be moved in both said extend direction and said retract direction.

40. The device of claim 39, wherein said mechanism includes:

a body integral with one of said pair of opposite engagement ends, said body defining a passage therethrough and a bore intersecting said passage; and

a rack movably received in said passage, said rack integral with the other of said pair of opposite engagement ends and having a plurality of teeth formed therealong.

41. The device of claim 40, wherein said driving mechanism includes a pinion rotatably received in said bore in engagement with said rack.

42. The device of claim 40, wherein said locking mechanism includes:
a lock member movably mounted in a chamber of said body and engageable with said rack; and

a lock pin engaged to said lock member and extending therefrom through said body, said lock pin engageable to move said lock member from said first position to said second position.